

atoms, an aromatic hydrocarbon group having from 6 to 30 carbon atoms, an alkoxy group having from 1 to 30 carbon atoms, an aryloxy group having from 6 to 30 carbon atoms, a thioalkoxy group having from 1 to 30 carbon atoms, a thioaryloxy group having from 6 to 30 carbon atoms, an amino group, an amido group, or a carboxyl group, and  $R^1, R^3, R^4, R^5, R^6$  and  $R^7$  may be the same or different, and  $R^1, R^3, R^4, R^5, R^6$  and  $R^7$  may be optionally bonded to each other to form a cyclic structure.)

(C2) a compound of a general formula,  $Z(R^2)_m$ . (In this formula; Z represents a metal element of Groups 2 to 13; m is an integer, indicating the valency of the metal element Z; and  $R^2$  represents a hydrocarbon group.).

and optionally,

(D) an alkylating agent.

6. A catalyst for copolymerization of olefins and styrenes, which comprises:

(A) a transition metal compound,

(C1) at least one selected from compounds of a general formula,  $(R^1)_3-C-OR^3, R^4-CO-R^5$  or  $R^6-CO-OR^7$  (In these formulae,  $R^1, R^3, R^4, R^5, R^6$  and  $R^7$  each represent a hydrogen atom, a halogen atom, an aliphatic hydrocarbon group having from 1 to 30 carbon atoms, an aromatic hydrocarbon group having from 6 to 30 carbon atoms, an alkoxy group having from 1 to 30 carbon atoms, an aryloxy group having from 6 to 30 carbon atoms, a thioalkoxy group having from 1 to 30 carbon atoms, a thioaryloxy group

having from 6 to 30 carbon atoms, an amino group, an amido group, or a carboxyl group, and  $R^1, R^3, R^4, R^5, R^6$  and  $R^7$  may be the same or different, and  $R^1, R^3, R^4, R^5, R^6$  and  $R^7$  may be optionally bonded to each other to form a cyclic structure.

(C2) a compound of a general formula,  $Z(R^2)_m$ , wherein Z represents a metal element of Groups 2 to 13; m is an integer, indicating the valency of the metal element Z; and  $R^2$  represents a hydrocarbon group, and optionally,

(D) an alkylating agent.

7. The catalyst of any of above 1 to 6 for copolymerization of olefins and styrenes, wherein at least one of three  $R^1$ 's is an aromatic hydrocarbon group having from 6 to 30 carbon atoms.

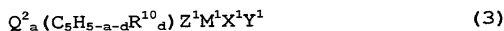
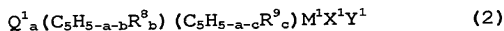
8. The catalyst of any of above 1 to 6 for copolymerization of olefins and styrenes, wherein three  $R^1$ 's are all aromatic hydrocarbon groups each having from 6 to 30 carbon atoms.

9. The catalyst of any of above 1 to 6 for copolymerization of olefins and styrenes, wherein three  $R^1$ 's are all phenyl groups.

10. The catalyst of any of above 1 to 9 for copolymerization of olefins and styrenes, wherein  $R^2$  is an alkyl group having at least 2 carbon atoms.

11. The catalyst of any of above 4 to 10 for copolymerization of olefins and styrenes, wherein Z is aluminium.

12. The catalyst of any of above 1 to 11 for copolymerization of olefins and styrenes, wherein the transition metal compound (A) is represented by any of the following general formulae (2) to (6):



in which  $Q^1$  represents a bonding group that crosslinks the two conjugated five-membered cyclic ligands ( $C_5H_{5-a-b}R^8_b$ ) and ( $C_5H_{5-a-c}R^9_c$ );  $Q^2$  represents a bonding group that crosslinks the conjugated five-membered cyclic ligand ( $C_5H_{5-a-d}R^{10}_d$ ) and the group  $Z^1$ ;  $R^8$ ,  $R^9$ ,  $R^{10}$  and  $R^{11}$  each represent a hydrocarbon group, a halogen atom, an alkoxy group, a silicon-containing hydrocarbon group, a phosphorus-containing hydrocarbon group, a nitrogen-containing hydrocarbon group, or a boron-containing hydrocarbon group; and a plurality of these groups, if any, may be the same or different, and may be bonded to each other to form a cyclic structure; a represents 0, 1 or 2; b, c and d each represent an integer of from 0 to 5 when a = 0, or an integer of from 0 to 4 when a = 1, or an integer of from 0 to 3 when a = 2; e is an integer of from 0 to 5;  $M^1$  represents a transition metal of Groups 4 to 6 of the Periodic Table;  $M^2$  represents a transition